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EXAMINER	
BROOKS, CLINTON A	

ART UNIT	PAPER NUMBER
1621	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/586,683	BUTTNER ET AL.	
	Examiner	Art Unit	
	CLINTON BROOKS	1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 November 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is **FINAL.**

Status of the Claims

Applicants amended claims 1-2, 4-15 stand currently amended. Applicants cancelled claim 3.

Claim Rejection - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 1, 2-11, 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,367,347 ("the '347 patent", made of record on the IDS dated July 20, 2006) in view of Hermann et al ("the Hermann article", made of reference in the IDS received July 20, 2006).

The '347 patent teaches a process for preparing dinitrotoluene (column 2, lines35 to 38 for example), by reacting toluene with nitric acid in the presence of sulfuric acid to give mononitrotoluene (column 2, lines 39 to 42 for example), separating the reaction product from step a) into an organic phase comprising mononitrotoluene and an aqueous phase comprising sulfuric acid (column 2, lines 43 to 45 for example), reacting the organic phase comprising mononitrotoluene with nitric acid in the presence of sulfuric acid to give dinitrotoluene (column 3, lines 46 to 50), separating the reaction product from step c) into an organic phase comprising dinitrotoluene and an aqueous phase comprising sulfuric acid (column 2, lines 51 to 52 for example), wherein the reaction product from step a) has a content of toluene of 0.1 to 10% by weight based on the organic phase ("0.5 wt% toluene", column 5, lines 43 to 50), and a content of nitric acid of from 0.1 to 1.2% by weight , based on the aqueous phase ("0.1 to 1.0 wt% nitrous and nitric acid", column 5, lines 50 to 60), and the phase separation in step b) is effected in such a way that further reaction of the toluene with the nitric acid is prevented (the phases

containing the nitric acid/sulfuric acid are separated from the toluene; column 5, lines 23 to 60). The nitric acid is a requirement for nitration of toluene to proceed.

Further, the '347 patent teaches transferring from step b) to step c) without purification (column 5, lines 43 to 49), reusing the aqueous phase containing sulfuric acid (for example column 5, lines 50 to 60), stirred tanks (Figure 2, **50** and **52**), one reactor for each step see (FIG. 2, **50** and **62**), step a) at 40-70 degrees Celsius (column 5, lines 36 to 43), step c) at to 90 degrees Celsius preferably about 70 degrees (column 5, lines 60 to 65), molar ratio of nitric acid to toluene at stage a) of 0.95-1.12 (column 5, lines 23 to 30, 140 liters of toluene (density 0.8669 g/mL) to 90 liters of nitric acid (density at 100% 1.513 g/mL) at 60% strength calculates to a molar ratio of 1.02, reconcentrating the sulfuric acid to from 85-96% and recycled (90-98 wt %, column 5, lines 50 to 60, and recycling see for example element **14** or figure 2, **46**), nitric acid from 58 to 100% (60-90%, column 5, lines 25 and 56 for example).

In the response filed, November 20, 2009 page 6, Applicants state that a dynamic separator is a centrifuge and cite the Hermann article (see above). The '347 patent fails to teach a centrifuge.

The Hermann article teaches a dynamic separator which is a centrifuge for use in nitration reactions. Further, the Hermann article teaches advantages of providing an "effective means for separating even difficultly separable emulsions (acid/organic type emulsions)" (page 240). Further, the Hermann article teaches that "the use of dynamic separators for phase separation helps to reduce the amount of organic material in the nitration building to a minimum. This is nowadays an important safety asset" (page 241). Thus, the Hermann article teaches that

dynamic separators are known in the specific art of nitration chemistry to solve safety problems caused by organic material in the nitration.

It would have been prima facie obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of the '347 patent with the teachings of the Herman article because one would want to have an effective means for separating even difficultly separable emulsions (acid/organic type emulsions). One skilled in the art would expect success in the combination at least because the present process contains and acid/organic type emulsion.

With respect to dynamic separation, Applicants define a dynamic separator to be a centrifuge. Applicants cite this definition in the Hermann article (made of record in the IDS, received July 20, 2006). This definition is not in the specification, but Applicants are relying on the Hermann article to teach that "dynamic separator" is a term of art. Specifically, the Hermann article teaches: "Dynamic separators (centrifuges) are an effective means for separating even difficultly separable emulsions" (page 240). In view of this definition, Examiner is giving the term dynamic separator the meaning of centrifuge, and therefore an additional reference is used to teach this limitation. Without this definition, the gravity filtration process of the '347 patent reads as a dynamic separator as presented in the previous office action.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 3,367,347 ("the '347 patent", made of record on the IDS dated July 20, 2006) in view

of Hermann et al ("the Hermann article", made of reference in the IDS received July 20, 2006) and further in view of United States Patent No. 5,689,018 ("the '018 patent").

The combination teaches as disclosed above. Those teachings are incorporated by reference herein.

With respect to the molar ratio of nitric acid to mononitrotoluene in stage c) in the range between 1.03 and 1.10 the '347 patent teaches 60% aqueous solution of nitric acid at about 100 L/min (column 5, lines 56 to 57). Further, the '347 patent teaches that "the organic phase **56** which contains about 0.5 wt % unreacted toluene, 20 wt % DNT and 80 wt % mononitroltoluenes passes through line **58** at about 190 L/min..." (column 5, lines 43 to 45). From these teachings one can reason that 60 L/min of nitric acid is present and 152 L/min of mononitrotoluene is present (80% of 190 L/min). Thus, 60 L of about nitric acid and about 190 L of mononitroltoluene are present in the same time frame. Calculating the mols of nitric acid: (60000 mL * (1.513 g/mL) = 90780 g nitric acid / (63.02 g/mol) = 1440.5 mol nitric acid. Calculating the mols of mononitrotoluene: (152000 mL * (0.8669 g/mL) = 131768.8 g /(137.14 g/mol) = 960.8 mols. Thus, the equivalents 1440.5/960.8 = 1.5 equivalents of nitric acid to mononitrotoluene. The '347 patent also teaches that lower molar ratios of nitric acid may be used to convert toluene to mononitrotoluene (1.02 equivalents at 60% strength).

The '347 fails to teach a molar ratio between 1.03 and 1.10 for step c).

The '018 patent teaches that 1.08 moles of nitrating acid can be used in the process to convert mononitrotoluene to dinitrotoluene (example 1, for example) wherein the molar ratio of 1.08 mols is maintained throughout the process and dinitrotoluene is isolated.

It would have been prima facie obvious to one having ordinary skill in that art at the time

the invention was made to used 1.08 moles of nitrating agent because one skilled in the art would reduce the quantity of nitrating agent needed and thereby reduce the cost and material waste associated with the process. One would expect success in the combination because the reaction and the reagents are the same.

Response to Applicants Arguments

In view of Applicant's amendment, the claim objection to claim 1 is withdrawn.

In view of Applicant's amendment, the 112/second paragraph rejection is withdrawn.

In view of the Applicant's amendment to claim 15, the 112/second paragraph rejection is withdrawn.

In view of Applicant's amendment the 102(b) rejection in view of the '347 patent is withdrawn.

Applicant's arguments with respect to claims 1-2, 4-15 have been considered but are moot in view of the new ground(s) of rejection.

In the remarks/ arguments section, Applicants state that "[a]pplicants have described (page 4, lines 20-42), in order to effectively and safely separate the two phases after mononitration, the available reactants in the mononitration must be depleted (99.5% of the toluene converted) and/or nitric acid content 0.4 to 1.0%. Otherwise, exothermic reaction will continue during the phase separation and may lead to uncontrolled nitration or run-away exotherm which could cause damage to the equipment or harm in the workplace. Typically, conventional systems consist of units of multiple reactors for each stage of nitration, which

requires a complex system of control and maintenance. Therefore, a method to safely produce DNT, which is simple in operation and employs minimum number of reactors is sought" (Office Action response received 11/20/2009, page 1).

With respect to the reaction apparatus, the '347 patent teaches a single reaction vessel (FIG. 2 as stated in the rejection of record).

Applicants argue Sawicki ("the '347 patent") describes that the spent acid contains 0.1 to 1.0 wt% nitrous and nitric acid. Further, Applicants argue that the '347 patent is silent with respect to actual nitric acid content and as the reference describes a conventional gravity separation, one of ordinary skill would understand that conventional concentrations of reactants must be present. Further Applicants state that the '347 patent describes an organic phase containing 0.5% unreacted toluene, 20 wt% DNT and 80 wt% mononitrotoluenes (Coll. 5, lines 43-45). Applicants argue that the values exceed 100% and are erroneous and that the '347 patent provides no experimental description of a mononitration system. Therefore, Applicants argue one of ordinary skill would recognize, the reference clearly points to low levels of toluene as is conventionally employed and does not disclose or suggest opposing conventional wisdom by allowing comparatively high levels of 0.5 to 8% by weight of toluene.

This argument has been considered but is not found to be persuasive for at least the following reason. With respect to the toluene limitation, the quote from the '347 patent is "[t]he organic phase 56 which contains about 0.5 wt% unreacted toluene, 20 wt% DNT and 80 wt% mononitrotoluenes passes..." (column 5, lines 43 to 45). When considered in the context of about the values taught by the '347 patent are not erroneous. The "about" is distributed; about

0.5 wt% unreacted toluene, about 20 wt% DNT and about 80 wt% mononitrotoluenes. In view of the about 0.5% this range overlaps with the claimed range.

As stated in the prima facie case above, with respect to dynamic separation, Applicants define a dynamic separator to be a centrifuge. Applicants cite this definition in the Hermann article (made of record in the IDS, received July 20, 2006). This definition is not in the specification, but Applicants are relying on the Hermann article to teach that "dynamic separator" is a term of art. Specifically, the Hermann article teaches: "Dynamic separators (centrifuges) are an effective means for separating even difficultly separable emulsions" (page 240). In view of this definition, Examiner is giving the term dynamic separator the meaning of centrifuge, and therefore an additional reference is used to teach this limitation (see rejection below). Without this definition, the gravity filtration process of the '347 patent reads as a dynamic separator as presented in the previous office action.

In a separate argument, Applicants argue that the Klingler reference ("the '018 patent", made of record in the previous office action) discloses a process wherein each stage contains a separate acid cycle and therefore the process described is not of counter current nature. This argument has been considered but is not persuasive for at least the following reasons. The '347 patent teaches the ranges as disclosed below. The '018 patent extends the range of the equivalents of nitric acid. In both cases nitration using nitric acid is accomplished. The '018 patent is relied upon to teach that less nitric acid can affect reaction, and is not used to incorporate the process. Further, as stated in the rejection of record, the '347 patent teaches two points defining an overlapping range (1.5 equivalents, and 1.02 equivalents), but the '018 patent teaches a specific range within the 1.03 to 1.10 limitation.

Conclusions

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CLINTON BROOKS whose telephone number is (571)270-7682. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DANIEL SULLIVAN can be reached on (571)272-0779. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about

the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Cab

/Daniel M Sullivan/

Supervisory Patent Examiner, Art Unit 1621